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ABSTRACT

In an investigation of causes of the disproportionate relation between head and body in children's drawings of the human figure, 160 children of 3-10 years of age produced drawings of a man viewed from the front and from the back. It was expected that if planning to include facial features increased the size of the head children drew, then heads would be larger in the frontal drawing, in which features are included, than in the dorsal drawing, in which they are not. Drawings of an empty plate and a plate laden with food were collected in an effort to investigate the possibility of a general effect of planning with regard to internal details on the size of an outline. Results showed a highly significant effect of figure orientation on head size at all ages. Children drew larger heads when the figure was viewed from the front than from the back. There was no comparable effect in drawings of plates. Head to body proportion was largest for the youngest children and declined significantly with age. There were significant differences between drawings of children from different schools. Results suggest that even though children's planning to include facial features may affect head size at all ages, there are wide differences between different populations of children. Additional research is needed to identify the basis of these differences. (RH)

Planning ahead: Influence of figure orientation on size of head in children's drawings of a man.

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Running Head: Planning ahead

ABSTRACT

Young children typically draw the head of a figure too large in proportion to the rest of the body. However, Thomas and Tsalimi (1988) found that this effect was significantly reduced in the drawings of 3-4-year-old children who produced head/trunk ratios that were more visually correct than the ratios in the drawings of older children. One reason why older children overestimate the size of the head might be that they emphasise facial features and thus draw a large head to ensure sufficient space to include all the features. An experiment is reported in which 160 children aged 3 to 10 years produced drawings of a man viewed from the front and the back. If planning to include facial features increases the size of the head, then heads should be larger in the front condition because facial features are included. Drawings were also collected of an empty plate and a plate with food to see if there is a more general effect of planning to include internal details on the size of an outline. Results showed a highly significant effect of orientation on head size at all ages. Children drew larger heads when the man was viewed from the front than from the back. No comparable effect was obtained with drawings of plates and inclusion of internal details left the size of the plate unchanged. Head/body proportion was largest for the youngest children and declined significantly with age. Although the Thomas and Tsalimi finding of more accurate head/body proportions in younger children was not replicated, there were significant differences between the drawings of children from different schools. The youngest group from one school produced head/body proportions that were close to the ratio reported by Thomas and Tsalimi. These results suggest that planning to include facial features may affect head size at all ages, but that wide differences exist between different populations of children and future research must identify the basis of these differences.

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BACKGROUND

The human figure is a popular topic of children's drawings, but there is a strong tendency to overestimate the size of the head that is drawn relative to the body (Freeman, 1980; Selfe, 1983; Thomas & Tsalimi, 1988). Although there is progress with age towards drawings with more visually realistic proportions (a head-body area ratio of 1·6 according to Selfe, 1983), even 10-year-olds exhibit this misproportion to some degree (Selfe, 1983). Explanations for children's exaggeration of head size often focus on some aspect of drawing strategy.

One factor is the tendency of children to draw the head of a figure first before proceeding to add other components such as the body and limbs. Freeman (1980) suggested several reasons why the size of first-drawn heads might be overestimated. A first-drawn head might be bigger simply because there is more room on the page, and a study by Thomas and Tsalimi (1988) showed clearly that the order of drawing the principal components of a figure (head and body) had a strong effect on relative size.

A second reason is that children who draw the head first may leave insufficient space on the page for inclusion of a body in the visually correct proportion, either because the head is drawn too large or is positioned too far down. Support for this explanation was also provided by Thomas and Tsalimi (1988) who found that about 20 per cent of their subjects failed to leave

sufficient space for a correctly proportioned body when the head was drawn first. In contrast, all children left sufficient space for the head when the body was drawn first.

A third reason for drawing the head too large relative to the body could be that the child anticipates the inclusion of facial details and enlarges the size of the head to ensure there will be sufficient space. Indirect evidence in support of this account was also reported by Thomas and Tsalimi (1988) who noted that children aged 3-4 years drew significantly smaller heads in a body-completion task than did children aged 5-8 years. Thus, the head-body area ratio produced by 3-4-year-olds was closer to the visually correct proportion than that produced by older children. Thomas and Tsalimi speculated that perhaps younger children pay less attention to the inclusion of facial features in their drawings, and therefore do not need to exaggerate the size of the head. In contrast, older children might plan to include facial details and begin their drawing with a head that is large enough to contain all the required features.

METHOD

The following study was carried out to examine the extent to which planning to include facial features might contribute to overestimated head-body proportions. The subjects were 160 children from two primary schools and their adjoining nurseries. One school was located in Eyemouth; the other in Dundee. There were 20 children from each school in each of four age groups: 3-4 years (mean 4:3); 5-6 years (mean 5:8); 7-8 years (mean 7:4); and 9-10 years (mean 9:6). Each child produced two drawings of a man; one as seen from the front and one from the back. Children were told to start by drawing the head first, but only the front condition required the depiction of facial features. It planning to draw

these features affects the size of the head, it was expected that the area would be greater in the front condition than in the back. An Action-Man doll was used to indicate figure orientation for these drawings. Half the children at each age first drew the man from the front and then from the back; the remainder completed their drawings in the reverse order.

Each child also received a second task to see whether planning for internal features leads to enlarged outlines in other types of drawings. Children were asked to make drawings of an empty plate and a plate with biscuits on it. If planning for inclusion of internal features is a general strategy that leads to enlarged outlines, then it was expected that drawings of the plate with biscuits would be larger than drawings of the empty plate. Half the children at each age first made a drawing of the empty plate and then the plate with biscuits; the remainder produced their drawings in the reverse order. Overall order of tasks (figure or plate) was counterbalanced for each age group. All drawings were completed in pencil on blank sheets of A4 paper (21 x 30 cm).

Measurement of area of the plate and the head and body of the man was carried out with a planimeter using criteria adopted by Thomas and Tsalimi (1988) and Thomas (personal communication). Head length was also measured and taken to be the perpendicular distance from the highest to the lowest point of the head. The length of the remainder of the figure was measured from the lowest point of the head to the lowest point of the figure. The amount of space left for depiction of the rest of the figure after the head had been drawn was obtained by measuring the distance from the lowest point of the head to the foot of the page.

RESULTS

Some drawings of the head and body were extremely large, particularly amongst those produced by the youngest children. Raw scores were therefore subjected to a logarithmic transformation to make the data more suitable for ANOVA by reducing heterogeneity of variance. Mean log values for front and back head areas at each age are shown in Fig. 1. A 3-way ANOVA (age X school X figure orientation) showed a highly significant effect for orientation ($F(1,152) = 15.12$, $p<.001$) with children at each age drawing the head larger from the front view than from the back. Examples of drawings are shown in Fig. 2. There was also a significant effect of age ($F(3,152) = 14.37$, $p<.001$), and Newman-Keuls tests ($p<0.05$) showed that the heads drawn by the 5-6-year-old group were significantly smaller than those produced at any other age, but no other age comparison was significant.

Results for body area are shown in Fig. 3. All age groups except the 9-10-year-olds drew a smaller body from the front than the back, but this effect of orientation was not significant. However, there was a significant age effect ($F(3,152) = 13.20$, $p<.001$) with 5-6-year-olds drawing smaller figure parts than all other age groups except the 7-8-year-olds. The head-body area ratio was larger at all ages for drawings from the front than the back (Fig. 4), but this was not a significant effect ($F(1,152) = 3.21$, $p>.07$). Head-body ratio differed between ages ($F(3,152) = 3.45$, $p<.05$), with the youngest children producing the most inaccurate ratios. This finding did not replicate the observation of Thomas and Tsalimi (1988) that 3-4-year-olds draw figures with a reasonably accurate head-body ratio. However, a surprising result was a significant age X school interaction ($F(3,152) = 3.76$, $p<.05$) which is shown in Fig. 5. The youngest children from the Eyemouth school (3-4 and 5-6 years) drew figures with much

smaller head-body ratios than did their Dundee counterparts, although post-hoc t-tests showed that only the difference between schools at 5-6 years was significant ($p<.05$). For the older groups the pattern was reversed, with 7-8-year-old Eyemouth children producing significantly larger head-body ratios ($p<.05$).

A second measure of relative proportion, head-body length ratio, also showed that children produced a larger, less accurate ratio for figures drawn from the front (Fig. 6), and this difference was significant ($F(1,152) = 5.71$, $p<.05$). The least accurate head-body length ratio was drawn by the 3-4-year-old children who produced significantly larger ratios than all other age groups. Head-body length ratio declined steadily with age, but no group achieved the visually correct ratio of 1:7 (Nash & Harris, 1970). Measurement of the available space left on the page after the head had been drawn permitted calculation of the minimum possible head-body length ratio for each drawing. This measure compares the length of the head with the available space between the lowest part of the head and the foot of the page, and indicates the smallest ratio that could have been achieved if the child had used all this space. Although the minimum possible ratio was larger at all ages in the front condition, the difference was not significant. However, there was a significant age effect ($F(3,152) = 9.03$, $p<.001$) with all but the youngest children having sufficient space to produce a drawing that would have been very close to the correct ratio (Fig. 7). Comparison of these minimum possible ratios with those that were actually produced (Fig. 6) shows that at all ages children failed to utilize the remaining space successfully.

Turning to the results for the plate drawings, there were again some very large drawings and individual scores were subjected to a logarithmic transformation. Mean transformed scores are shown in Fig. 8, and although there

was a significant age effect ($F(3,152) = 39.84$, $p<.001$), the difference in size between the full and empty plate was not significant. The effect for age showed the same pattern that was found with head and body area; the 5-6-year-old group produced the smallest drawings overall ($p<.05$ for each age-group comparison), but none of the differences between remaining age groups was significant.

DISCUSSION

The finding that children at all ages drew a larger head from the front than from the back supports Freeman's (1980) suggestion that children do exaggerate the size of the head to accommodate facial features. However, this strategy of planning for inclusion of detail may be specific to certain figures. In the plate drawing task, the inclusion of food on the plate had no comparable effect on the size of the drawing. This result appears to run counter to a recent finding of Henderson and Thomas (1989) who reported that asking children to include specific details on the jacket of their drawing of a man resulted in drawings with a significantly larger trunk area relative to the head. However, a comparison of the demands of these various tasks may resolve this apparent conflict.

In the Henderson and Thomas (1989) study, children were instructed to draw specific details (buttons and pocket) on the man's jacket. Unlike the biscuits on the plate in our study, the positioning of these jacket features is fairly specific and must be accomplished with some precision. Pockets and buttons, like eyes, nose, and mouth, must be put at definite locations if the drawing is to be an accurate representation. Biscuits, on the other hand, can be placed almost anywhere on the plate and the drawing can still be recognizable. What may be important in planning a drawing is whether details have some pre-determined

location in relation to each other and the external frame within which they appear. Further support for this interpretation comes from the observation that almost all children of 5 years and older in the present study included hair in their drawings of the man viewed from the back. Although hair was a feature that appeared within the boundary of the head, head size was significantly smaller when drawn from the back view. However, hair can easily be added after the outline has been drawn, and its inclusion may not need any planning.

Surprisingly, although head size in the present study was reduced in the back condition and body size remained constant across conditions, there was no reliable effect of figure orientation on head-body area ratio. Henderson and Thomas (1989) also examined the effect on head-body ratio of drawing a man from the front and the back, and they did report a significantly larger ratio for the front condition with 4-7-year-olds. Although the trend in the present study was in the same direction, the failure to achieve a significant effect may derive from the differences that were found between children in the two schools. The basis for these differences is unclear, but their existence suggests the need for caution in interpreting the findings of drawing studies from restricted populations of children. One possible reason for the difference between the schools was that the 5-6-year-old children at Eyemouth nad been involved in a "Foundations of Writing Scheme" (Jackson & Michael, 1986). This scheme emphasizes the importance of drawing skills, and t ese children had received considerable practice in drawing human figures. They produced heads of similar size both in the front and back conditions, and a tentative explanation is that because human figure drawing was such a regular feature of their daily school activities, their drawings had become sterotyped and were therefore unaffected by the varying demands of the front and back conditions.

The finding that head-body area ratio decreased progressively with age did not replicate the observation of Thomas and Tsalimi (1988) that 3-4-year-old children produced the smallest (and most accurate) ratios, although the children from Eyemouth did show a pattern of change similar to that reported by Thomas and Tsalimi (1988). The explanation for their reported finding was that the youngest children may have been less concerned about the depiction of facial detail and therefore did not inflate head size to make room for facial features. This suggests that age is of less relevance in this context than drawing competence, and the differences between these several groups of young children may have arisen from variations in the drawing experience offered in the nursery setting. A more appropriate research strategy to test the Thomas and Tsalimi hypothesis might be to look for longitudinal changes in head-body ratio. If exaggerated head size is influenced by planning to include facial details, then all children should show a shift to increasing head-body ratio as their drawing skill improves and they attend more to the face.

Planning to have sufficient room for facial features cannot alone explain why children draw heads too large. Even in the back condition the head-body area ratio was well in excess of the visually correct proportion at all ages. Although position of the head on the page could account for this effect in 3-4-year-olds, older children generally did leave enough space for a correctly proportioned drawing. However, it cannot be assumed that the child regards all the space below the head to be available, and perhaps there is region at the foot of the page into which the child is reluctant to venture.

One interesting finding was the reduction in size of all drawings by children aged 5-6 years. This effect was shown by children from both schools, but the reason is unclear. One possibility is that graphic skill may stabilize for a while at 5-6 years as a result of practise. Previous research has shown that

repeated drawings of the same topic become smaller (Fox & Thomas, 1990; Henderson & Thomas, 1989; Sechrest & Wallace, 1964), and the reduction in size at 5-6 years may be an instance of the same effect, but over a longer time scale. The subsequent increase in size from 7-10 years could be due to the inclusion of more detail by older children in their drawings with the consequent need to enlarge the size to fit it in. There was a significant increase in the number of children including such detail between 5-6 years and 7-8 years ($X^2(1) = 5.6$, $p<.025$), and between 7-8 years and 9-10 ($X^2(1) = 20.8$, $p<.001$), which lends support to this explanation.

In conclusion, the present study confirms that planning to include facial detail contributes to the enlargement of head size in drawings of a human figure, although with age there is a trend to produce drawings with head-body proportions that become increasingly closer to the visually correct ratio. However, considerable differences may exist between individual groups of children which may depend on their drawing experience in the classroom.

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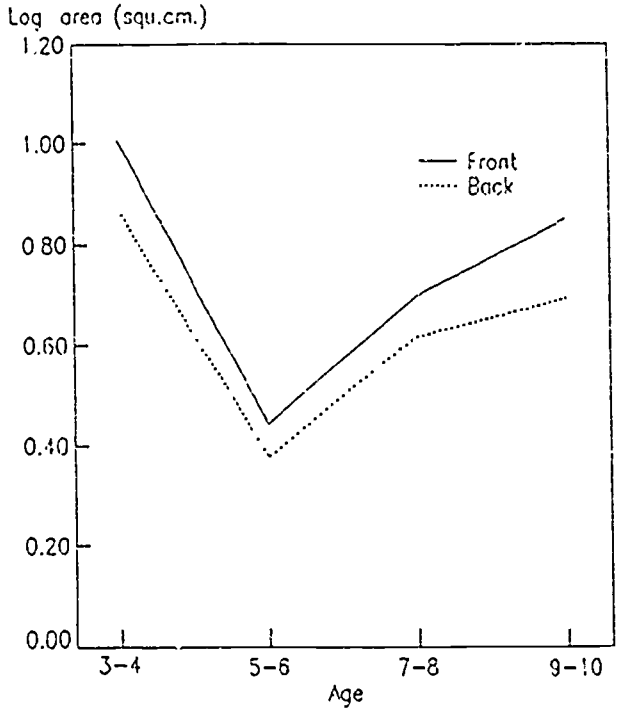

Fig. 1. Head area: Effects of figure orientation and age.

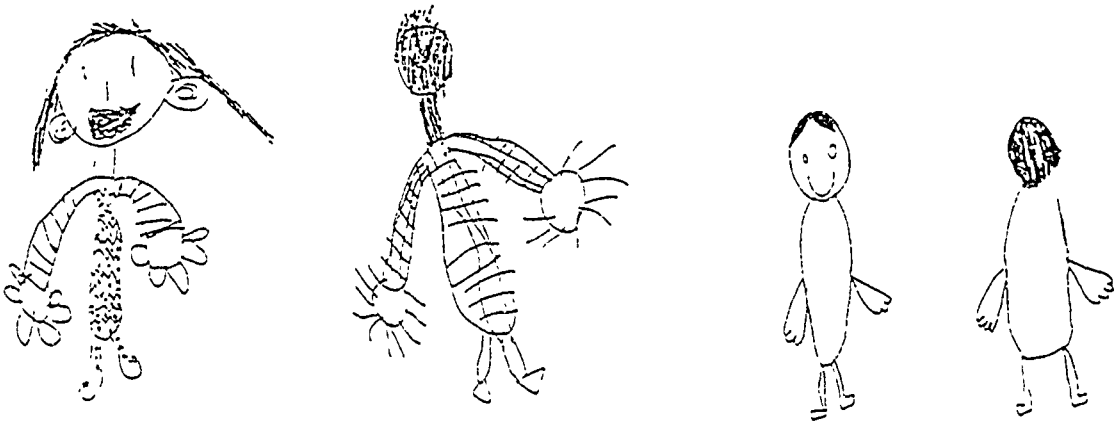

Fig. 2. Examples of drawings by 5-6-year-olds with larger head area in the front.

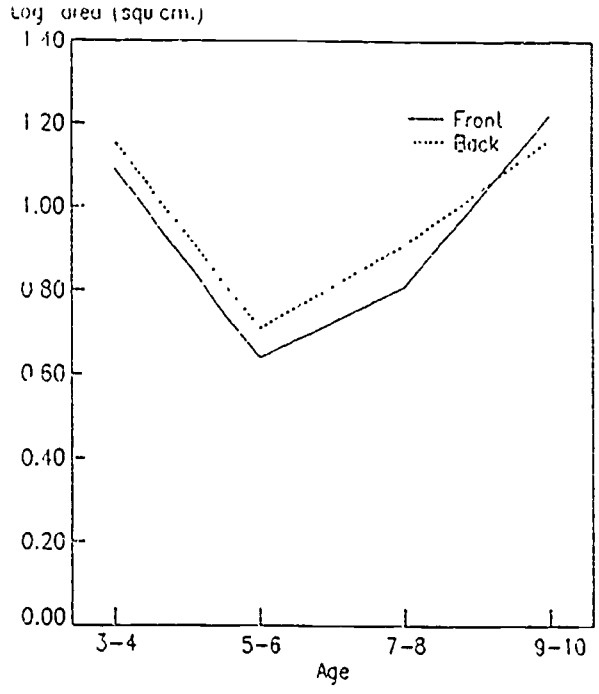

Fig. 3. Body area: Effects of figure orientation and age.

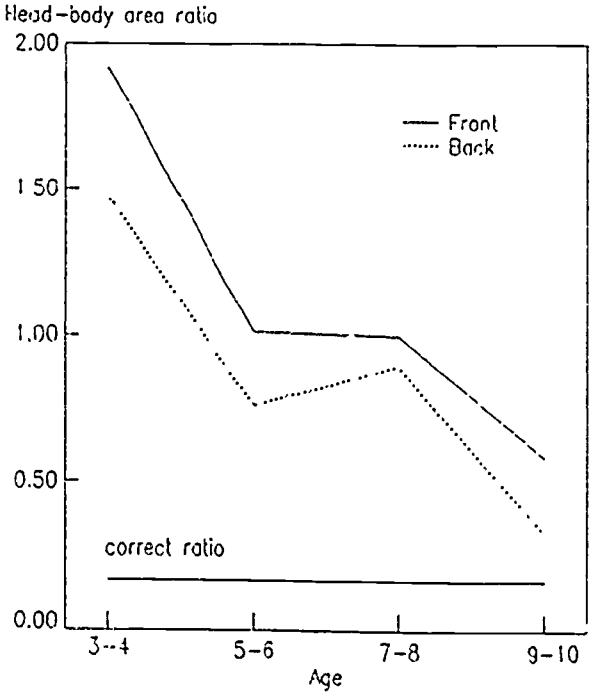

Fig. 3. Head-body area ratio: Effects of figure orientation and age.

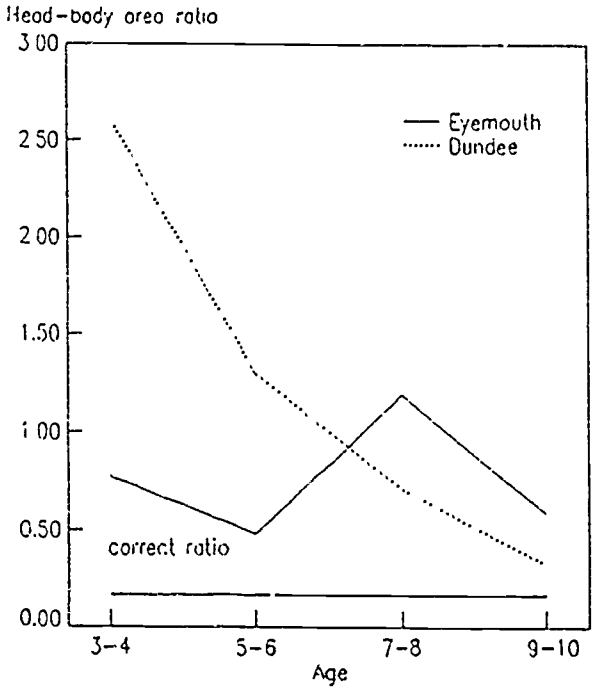

Fig. 5. Head-body area ratio: Age and school interaction.

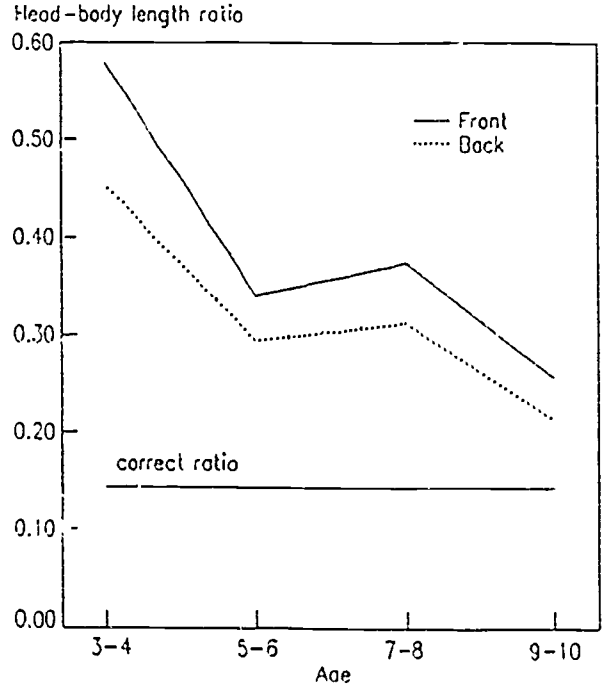

Fig. 6. Head-body length ratio: Effects of figure orientation and age.

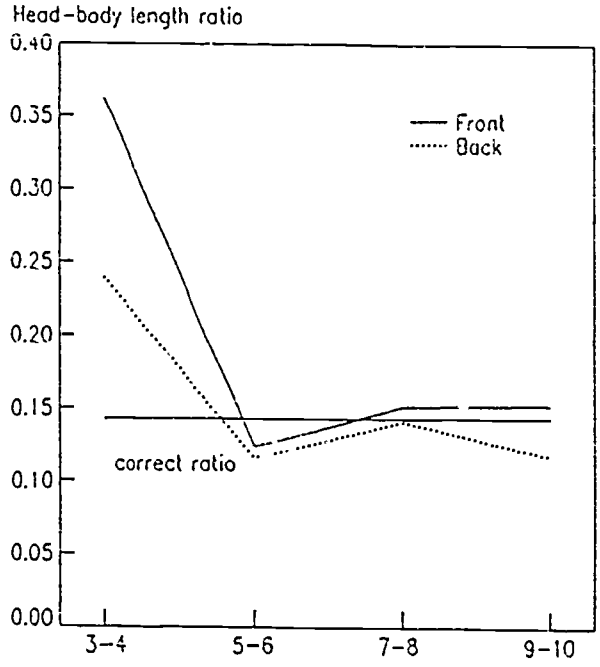

Fig. 7. Minimum possible head-body length ration: Effects of figure orientation and age.

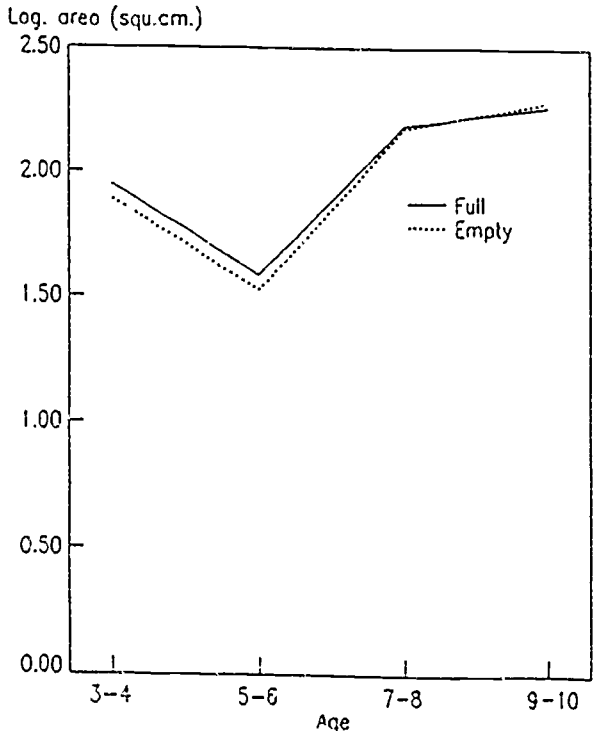

Fig. 8. Plate area: Effects of age and internal detail.